

AN 91-356487 [49] WPIDS

DNN N91-272859

TI **Brush assembly for fractional horsepower DC motor**
- has two **brushes** side by side connected electrically in parallel and having different **resonant frequencies**

DC V04 V06

IN BALNES, R F; BAINES, R F
PA (JOHN-N) JOHNSON ELECTRIC SA

CYC 3

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/ BINARY DATA / IMAGE001.TIF

AB GB 2244603 A UPAB: 930928

The electric **motor brush** assembly comprises resilient electrically conductive support arranged to carry two or more **brushes** axially displaced with respect to a longitudinal axis of the **motor** and connected electrically in parallel. The support normally comprises a separate arm (18,19) for each **brush** ((20,21)).

The separate arms may be arranged to have different natural resonance frequencies of oscillation. The **brushes** may be different sizes and/or of different physical densities.

ADVANTAGE - Reduces current density required for each **brush** without increasing size of **brushes**.

3/6

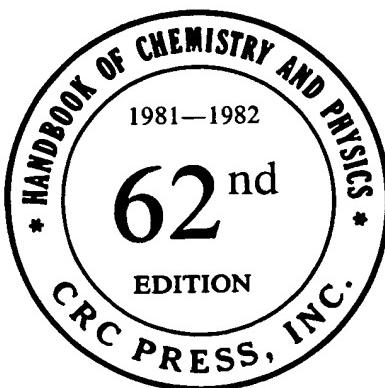
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A Ready-Reference Book of Chemical and Physical Data



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PHYSICAL CONSTANTS OF INORGANIC COMPOUNDS (Continued)

| Solubility, in grams per 100 cc | | Cold water | Hot water | Other solvents | Name | Synonyms and Formulae | Mol. wt. | Crystalline form, properties and index of refraction | Density or spec. gravity | Melting point, °C | Boiling point, °C |
|---|---|--|-------------------------------------|---------------------------|------------------------|--|-----------------------|--|--------------------------|-------------------|-------------------|
| | | | | | | | | | | | |
| <i>Other solvents</i> | | | | | | | | | | | |
| s HNO ₃ ; aq reg; i alk; d dil HCl; s HCl; i HNO ₃ ; H ₂ SO ₄ | Co-balt complexes | Co[C ₂ H ₄ (NH ₃) ₄]Cl ₂ .3H ₂ O | 399.64 | br pr..... | 1.542 ¹⁷ | 256; -3H ₂ O, 100 | ..... | v s | ..... | ..... | ..... |
| i H ₂ SO ₄ ; s HCl; 1.04 ¹⁸ MeOH; i NH ₃ | Methylene-diaminecobalt-(III) chloride | Co(NH ₃) ₂ (NO ₃) ₃ | 248.04 | yel, rhomb pl or leaf | 1.992 ¹⁸ | d 158 | exp 164 | 0.177 ^{18,19} | 0.28 ²⁰ | ..... | ..... |
| 2.5 ²¹ al; 54.5 ²¹ MeOH | Nitrotriamminecobalt-(III) nitrate | [Co(NH ₃) ₄ (NO ₃) ₃]NO ₃ | 265.07 | yel, rhomb..... | 1.922 ¹⁷ | ..... | ..... | 3 ²⁰ | ..... | ..... | ..... |
| Colombium..... | K[Co(NH ₃) ₄ (NO ₃) ₄] | 316.12 | yel, rhomb..... | 2.076 ²¹ | ..... | ..... | ..... | 1.758 ^{16,21} | ..... | ..... | ..... |
| see Niobium. | Cu..... | 63.546 | redish met, cub..... | 8.92 | 1063.4±0.3 | 2567 | i | i | ..... | ..... | ..... |
| Acetate, basic..... | Blue verdigris. | Cu(C ₂ H ₅ O) ₂ .CuO.6H ₂ O | 369.26 | grnb-bl powd..... | ..... | ..... | ..... | sl s | ..... | ..... | ..... |
| (II) Acetate..... | Neutral verdigris. | Cu(C ₂ H ₅ O) ₂ .H ₂ O | 199.65 | dk grn powd, 1.845, 1.550 | 1.882, anhydr. 1.93 | 115 | d 240 | 7.2 | 20 | 7.14 al; s eth | ..... |
| Acetate, basic..... | Paris green. | Cu(C ₂ H ₅ O) ₂ .3Cu(AsO ₃) ₂ (approx) | 1013.77 | em grn powd..... | ..... | ..... | i | ..... | ..... | ..... | ..... |
| (II) Acetate meta- titanate..... | Cu ₂ C ₂ O ₄ | 151.10 | red, amorph, expl..... | ..... | exp d 100-105 | exp 202 | v sl s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu(NH ₃) ₂ Cl ₂ | 181.64 | dk grn cr, exp..... | ..... | ..... | ..... | i | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu(NH ₃) ₂ Cl ₂ | 168.51 | grn cr..... | 2.32 ²² | 260-270 | d 300 | i | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu(NH ₃) ₂ Cl ₂ | 236.63 | bl, cub..... | 1.48 ²³ | ..... | ..... | v s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | [Cu(NH ₃) ₄]S ₂ O ₈ | 291.79 | vlt-bl cr..... | ..... | d 160 | ..... | s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | [Cu(NH ₃) ₄](NO ₃) ₂ | 255.67 | dk-bl, oct..... | 1.91 ²⁴ | d 210 exp | ..... | s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | [Cu(NH ₃) ₄](NO ₃) ₂ | 223.61 | vlt-bl, tetr..... | ..... | -2NH ₃ 97 | ..... | v s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cuprum ammoniacale. | Cu ₂ (AsO ₃) ₂ .H ₂ O | 245.74 | dk-bl, rhomb, unstab | 1.79 ²⁴ | -NH ₃ .H ₂ O, 30 | ..... | 18.05 ²⁴ | ..... | ..... | ..... |
| Acetate, basic..... | Cu ₂ (AsO ₃) ₂ .4H ₂ O..... | 540.52 | bl..... | ..... | ..... | ..... | i | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu ₂ (AsO ₃) ₂ .2H ₂ O..... | 911.42 | ..... | ..... | ..... | ..... | i | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu ₂ As ₂ | 467.54 | bl, oct..... | 7.56 | 830 | ..... | i | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Nat. domeykite. Cu ₂ As ₂ | 265.54 | hex..... | 8.0 | 830 | ..... | i | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Schoele's green. | 187.47 | grn powd..... | ..... | d | ..... | i | ..... | ..... | ..... | ..... |
| Acetate, basic..... | CuHAsO ₃ (T) | 105.56 | col cr, v exp..... | 3.26 | ..... | ..... | 0.00075 ²⁵ | ..... | ..... | ..... | ..... |
| Acetate, basic..... | CuN ₃..... | ..... | ..... | ..... | ..... | ..... | 0.008 ²⁶ | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu(N ₃) ₂ | 147.58 | brn-red or brn-yel cr, exp..... | 2.604 | exp 215 | ..... | sl s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu(C ₂ H ₅ O) ₂ .2H ₂ O..... | 341.80 | lt bl cr powd..... | ..... | -H ₂ O, 110 | ..... | s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu(BO ₃) ₂ | 149.16 | blsh grn cr powd..... | 3.859 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu ₂ Br ₃ | 212.24 | yel..... | 8.116 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu(BrO ₃) ₂ .6H ₂ O..... | 427.45 | bl-grn, cub..... | 2.583 | d 180 | -6H ₂ O, 200 | v s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | CuBr (or Cu ₂ Br ₃)..... | 143.45 | wh, cub, 2.116..... | 4.98 | 492 | 1345 | v sl s | d | ..... | ..... | ..... |
| Acetate, basic..... | CuBr ₃ | 223.31 | blk, monoel, deliq | 4.77 ²⁷ | 498 | ..... | v s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | CuBr ₃ .3Cu(OH) ₂ | 516.02 | em grn, rhomb..... | 4.00 | -H ₂ O, 215 | d 240-250 | i | d | ..... | ..... | ..... |
| Acetate, basic..... | Cu(C ₂ H ₅ O) ₂ .2H ₂ O..... | 273.77 | dk grn cr..... | ..... | ..... | ..... | v sl s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | CuCO ₃ | 187.09 | yel..... | 4.40 | d | ..... | i | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Nat. malachite. CuCO ₃ .Cu(OH) ₂ | 221.11 | dk grn, monocl, 1.655, 1.875, 1.909 | 4.0 | d 200 | ..... | i | d | ..... | ..... | ..... |
| Acetate, basic..... | Nat. azurite, chrysocolla. 2CuCO ₃ .Cu(OH) ₂ | 344.65 | bl, monocl, 1.730, 1.758, 1.838 | 3.88 | d 220 | ..... | i | d | ..... | ..... | ..... |
| Acetate, basic..... | Cu(ClO ₄) ₂ .6H ₂ O..... | 338.63 | grn, cub, deliq..... | 65 | d 100 | 207 ²⁸ | v s | ..... | ..... | ..... | ..... |
| Acetate, basic..... | Cu(ClO ₄) ₂ .3Cu(OH) ₂ | 523.11 | grn cr or amorph..... | 3.65 | d | ..... | i | ..... | ..... | ..... | ..... |

PHYSICAL CONSTANTS OF INORGANIC COMPOUNDS (Continued)

| Name | Synonyms and Formulas | Mol. wt. | Crystalline form, properties and index of refraction | Density or spec. gravity | Melting point, °C | Boiling point, °C | Solubility, in grams per 100 cc | | |
|-----------------------------|---|-------------|---|--------------------------------|----------------------------|----------------------------|---------------------------------|---|---|
| | | | | | | | Cold water | Hot water | Other solvents |
| Calcium | | | | | | | | | |
| salicylate..... | Ca(C ₆ H ₅ O ₂) ₂ H ₂ O | 350.34 | wh, oct. | 2.88 | -2H ₂ O, 120 | | 4 ¹⁴ | s | s al |
| selenate..... | CaSeO ₄ | 183.04 | col. | 2.68 | | | 7.9 ⁴⁷ | | |
| selenate, dihydrate..... | CaSeO ₄ .2H ₂ O | 219.07 | col, monocl. | 2.68 | | | | | |
| selenide..... | CaSe | 119.04 | cub, 2.274 | 3.57 | | | 0.0095 ¹⁷ | | s HCl |
| metasilicate(s)..... | Nat. pseudowollastonite. CaSiO ₃ | 116.16 | col, monocl, 1.610 | 2.905 | 1540 | | | | |
| | | | 1.611, 1.664 | | | | | | |
| metasilicate(s)..... | Nat. wollastonite. CaSiO ₃ | 116.16 | col, monocl, 1.616 | 2.5 | tr 1200 | | | | |
| | | | 1.629, 1.631 | | | | | | |
| di-orthosilicate (I)..... | CaSiO ₄ | 172.24 | col, monocl, 1.717 | 3.27 | 2130 | | | | |
| di-orthosilicate (II)..... | CaSiO ₄ | 172.24 | col, rhomb, 1.717 | 3.28 | tr to (I) 1420 | | | | |
| di-orthosilicate (III)..... | CaSiO ₄ | 172.24 | col, monocl, 1.642 | 2.97 | tr to 675 | | | | |
| (tri)-silicate..... | Nat. alite. CaSiO ₄ or (3CaO.SiO ₂) | 228.32 | col, monocl, a 1.718, β 1.724 | 2.5 | 1900 (incoagr) | | i | d | s a, alk |
| | | | | | | | 0.004 ¹⁸ | | i al, eth |
| silicide..... | CaSi | 96.25 | cr powd. | | 179-180 | | 0.193 ¹⁰ | 0.89 ⁴⁶ | |
| stearate..... | Ca(C ₁₈ H ₃₅ O ₂) ₂ | 607.04 | col, 1.460, 1.540, | | | | | | |
| succinate..... | CaC ₄ H ₆ O ₄ .3H ₂ O | 212.22 | 1.610 | | | | | | |
| sulfate..... | Nat. anhydrite. CaSO ₄ | 136.14 | col, rhomb, or monocl, 1.569, | 2.960 | monocl 1450 | rhomb tr to monocl 1193 | 0.209 ³⁰ | 0.1619 ¹⁰⁰ | s a, NH ₄ salts, Na ₂ S ₂ O ₃ , glyc |
| | | | 1.575, 1.613 | | | | | | |
| sulfate..... | Soluble anhydrite. CaSO ₄ | 136.14 | col, hex or tricl. | 2.61 | tr to rhomb | | | | |
| | | | 1.505, 1.548 | | >200 | | | | |
| sulfate half-hydrate..... | Plaster of Paris. CaSO ₄ .½H ₂ O | 145.15 | wh powd. | | -½H ₂ O, 163 | | 0.3 ³⁰ | s l s | s a, NH ₄ salts, Na ₂ S ₂ O ₃ , glyc |
| | | | | | | | | | |
| sulfate dihydrate..... | Nat. gypsum. CaSO ₄ .2H ₂ O | 172.17 | col, monocl, 1.521 | 2.32 | -½H ₂ O, 128 | -2H ₂ O, 163 | 0.241 | 0.222 ¹⁰⁰ | s a, NH ₄ salts, Na ₂ S ₂ O ₃ , glyc |
| | | | 1.523, 1.530 | | | | | | |
| sulfide..... | Nat. oldhamite. CaS | 72.14 | col, cub, 2.137 | 2.5 | d | | 0.021 ¹⁸ d | 0.048 ³⁰ d | d a |
| | | | col pr. | | d 15-18 | | | | |
| sulfide, hydro-..... | Ca(HS) ₂ .6H ₂ O | 214.32 | col, hex | | -½H ₂ O, >250 | | 0.0043 ¹⁸ | 0.0011 ¹⁰⁰ | s a H ₂ SO ₄ |
| | | | | | | | | | |
| sulfite..... | Ca(SO ₃) ₂ ·½H ₂ O | 129.15 | yellow liq, strong | | | | s | | s a |
| sulfite, dihydrogen..... | Ca(HSO ₃) ₂ | 202.22 | SO ₂ odor | | | | | | |
| d-tartrate..... | CaC ₄ H ₆ O ₄ .4H ₂ O | 260.21 | col, rhomb, 1.525, | | d | | 0.0266 ⁹ | 0.0689 ¹⁷ s | s l s al |
| | | | 1.535, 1.550 | | | | | | |
| dL-tartrate..... | CaC ₄ H ₆ O ₄ .4H ₂ O | 260.21 | tricl, powd or need | | -4H ₂ O, 200 | | 0.0032 ⁹ | 0.0078 ¹⁷ s | s HCl; i ac, a |
| | | | | | | | | | |
| mesotartrate..... | CaC ₄ H ₆ O ₄ .3H ₂ O | 242.20 | wh, monocl or tricl pr | | -3H ₂ O <170 | i | 0.16 ¹⁰⁰ | 0.28 ¹⁸ , 0.85 ¹⁰⁰ ac a | |
| | | | | | | | | | |
| telluride..... | CaTe | 167.68 | wh fl. | 4.873 | >960 | | s l s | s | s a |
| | | | CaTeO ₃ | | | | | | |
| tellurite..... | | 215.68 | yel cr. | | | | s | | s al |
| thiocarbonato, tri-..... | CaCS ₃ | 148.28 | wh er, deliq. | | | | v s | v s | v s al |
| thiocyanato..... | Ca(SCN) ₃ .3H ₂ O | 210.29 | col, trig, 1.5496 | 2.176 | | | 16 ⁹ | 30 ⁹ | |
| | | | col, trig, 1.5496 | | | | | | |
| di-thionate..... | Ca(SO ₃) ₂ .4H ₂ O | 272.27 | tricl. | 1.872 | d | 100 ⁹ | d | s al | |
| | | | | | | | | | |
| thiosulfate..... | CaSO ₃ .6H ₂ O | 260.30 | col, cub, rhomb, | 4.10 | 1975 | | | | |
| | | | β 2.34 | | | | | | |
| metatitanate..... | Nat. perovskite. CaTiO ₃ | 135.98 | wh, tetr, 1.9263, | 6.062 ²⁹ | | | 0.00064 ¹⁸ | 0.00012 ¹⁰⁰ | |
| | | | 1.9107 | | | | | | |
| tungstate..... | CaWO ₄ | 287.93 | col, w sc, tetr. | | | | 0.2 | | i al, a; s NH ₄ Cl |
| | | | 1.918, 1.934 | | | | | | |
| tungstate..... | Nat. scheelite. CaWO ₄ | 287.93 | col, tric. | | -7H ₂ O, 105 | -10H ₂ O, d | | | d a |
| | | | | | | | | | |
| metatungstate..... | Ca ₂ H ₄ (H ₂ (W ₂ O ₇)) ₂ .27H ₂ O | 3500.96 | | | | | 8.28 ⁹ | 7.39 ¹⁰⁰ | |
| | | | | | | | | | |
| valerate..... | Ca(C ₆ H ₅ O ₂) ₂ | 242.33 | col, monocl. | 4.78 | 2550 | | i | i | i a, alk |
| | | | CaZrO ₃ | | >3550 | 4827 | i | i | s liq Fe; i a, alk |
| metazirconate..... | | 179.30 | col, cub, 2.4173 | 3.51 | | 4827 | i | i | |
| | | | Diamond. C. | | | | | | |
| Carbon..... | | 12.01 | Graphite. C. | 2.25 ⁹ | subl 3652- | 4827 | i | i | i a, alk |
| | | | | | 97 | | | | |
| carbon, amorphous..... | C..... | 12.01 | amorph, blk. | 1.8-2.1 | subl 3652- | 4827 | i | i | s CS ₂ ; v s al, alk |
| | | | | | 97 | | | | |
| (di)-bromide, hexa-..... | Hexabromomethane. C ₆ Br ₆ | 503.48 | rhomb pr, 1.740, | 3.823 | 148-149 d | 210 | i | | s al, eth, chl |
| | | | 1.847, 1.863 | | | | | | |
| bromide, tetra-..... | Tetrabromomethane. CBr ₄ | 331.65 | col, monocl or oct | 3.42 | 48.4; m.p. | 90.1 | | | |
| | | | | | | 57.5 | 227 | | |
| (di)-bromide, tetra-..... | Tetrabromomethylene. C ₂ Br ₄ | 343.66 | | | | | i | | s al, eth, oils |
| | | | | | | | | | |
| (di)-chloride, hexa-..... | Hexachloro ethane. CCl ₆ | 236.74 | col, rhomb, tricl or cub | 2.091 | subl 187 | | | v s al s | s al, bz, chl, eth |
| | | | | | | | | | |
| chloride, tetra-..... | Tetrachloromethane. CCl ₄ | 153.81 | col liq, 1.4601. | 1.5867 ²⁹ | -23 | 76.8 | | | |
| | | | | | | | | | |
| (di)-chloride, tetra-..... | Tetrachloroethylene. C ₂ Cl ₄ | 165.83 | col liq, eth odor. | 1.6311 ¹⁸ | -22.4 | 120.8 | | | s al, eth |
| | | | 1.5055 | | | | | | |